

Growth of Ultra-High Purity Silicon Carbide Crystals in an Ambient Containing Hydrogen

ABSTRACT OF THE INVENTION

A method is disclosed for producing semi-insulating silicon carbide crystal with a controlled nitrogen content. The method includes the steps of introducing an ambient gas containing hydrogen into a sublimation growth chamber, heating a silicon carbide source powder to sublimation in the hydrogen ambient growth chamber while, heating and then maintaining a silicon carbide seed crystal in the hydrogen ambient growth chamber to a second temperature below the temperature of the source powder, at which second temperature sublimed species from the source powder will condense upon the seed crystal, continuing to heat the silicon carbide source powder until a desired amount of silicon carbide crystal growth has occurred upon the seed crystal, while maintaining an ambient concentration of hydrogen in the growth chamber sufficient to minimize the amount of nitrogen incorporated into the growing silicon carbide crystal, and while maintaining the source powder and the seed crystal during sublimation growth at respective temperatures high enough to increase the number of point defects in the growing crystal to an amount that renders the resulting silicon carbide crystal semi-insulating.